A.M., assistant professor of mathematics. Professor Butterfield is a graduate of the class of 1893, and was formerly instructor in civil engineering at the institute. For the past ten years he has been professor of mathematics at the University of Vermont. A number of appointments have also been made to the corps of instructors as follows: Robert H. Goddard, B.S., W.P.I., '08, instructor in physics; John F. Mangold, B.S., Cornell, Iowa, '07, instructor in civil engineering; Dr. W. F. Holman, University of Nebraska and University of Göttingen, instructor in physics; James A. Bullard, A.B., Williams, '08, instructor in mathematics; Royal W. Davenport, B.S., W.P.I., '08, instructor in civil engineering; Charles J. Adams, A.B., Amherst, '96, instructor in modern languages; J. Howard Redfield, A.B., Haverford, '99, and B.S. M.I.T., '02, instructor in mathematics; Albert A. Nims, B.S., W.P.I., '08, graduate assistant in electrical engineering; John C. Harvey, B.S., W.P.I., '08, Alden W. Baldwin, B.S., W.P.I., '08, and Richmond W. Smith, B.S., W.P.I., '08, graduate assistants in mechanical engineering.

H. J. EUSTACE has been appointed professor of horticulture in the Michigan Agricultural College and horticulturist of the experiment station. He graduated at the Michigan Agricultural College in 1901 and for five years was assistant botanist at the New York Agricultural Experiment Station at Geneva, N. Y., and for the past two years has been connected with the Fruit Storage and Transportation Investigations of the Bureau of Plant Industry, U. S. Department of Agriculture.

VICTOR T. WILSON, instructor in drawing, Cornell University, 1893 to 1903, professor of engineering drawing, State College (Pennsylvania), 1907–8, has been elected professor of drawing and design in the Michigan Agricultural College.

THE following are the new appointments in the science departments of the University of Maine: L. H. Merrill, Sc.D., professor of biological and agricultural chemistry; F. L. Russell, B.S., V.S., professor of bacteriology and veterinary science; Wallace Craig, Ph.D., professor of philosophy; L. E. Woodman, M.A., assistant professor of physics; V. R. Gardner, M.S., assistant professor of horticulture; W. A. Brown, B.S.A., assistant professor of animal industry; C. E. Lewis, Ph.D., associate vegetable pathologist; M. R. Curtis, M.A., assistant in biology; H. N. Conser, M.S., instructor in botany; E. M. Wallace, B.A., instructor in biology; J. L. Coon, Ph.B., tutor in physics; E. A. Garlock, B.S., tutor in physics; J. P. Farnsworth, B.S., tutor in drawing; R. K. Steward, B.S., tutor in civil engineering; A. G. Durgin, B.S., assistant in chemistry.

QUOTATIONS

AN EDUCATIONAL PARADOX

A EUROPEAN would be put to his wit's ends by the recent Chicago dispatch announcing that a professor of philosophy is about to exchange his university chair for one in a theological seminary in order to enjoy greater academic freedom. "America is more topsy-turvy than China!" the bewildered foreigner might ejaculate. "A university is the very citadel of intellectual liberty; a theological school, dogma's safest stronghold." Reference to catalogues would not clear his mind. The university in question declares that it "was not established with a view of forcing on the attention of students the creed of any particular church, but for the promotion of learning under influences conducive to the formation of manly Christian character." Its charter "carefully provides that no particular religious faith shall be required of those who become students at the institution." Surely, then, if students are not to be reminded of any doctrine, their instructors can not be expected to insinuate one into their professional utterances. In the seminary, on the other hand, teachers and learners are supposed to accept at least the broader Christian dogmas and to center their studies about these. Can the European, noting such facts at long range, be blamed for distrusting the whole story? The paradox may well confuse even our own countrymen who have not been

following contemporary tendencies in school and church. Professor George A. Coe's reported difficulties with the Methodists at Northwestern University and his acceptance of a chair at Union Theological Seminary are anomalous products of two conflicting movements in the educational and religious worlds —movements which may, in the course of years, lead to still more curious situations.

Andover's transfer to Cambridge and Union Theological Seminary's approaching shift to Morningside Heights reflect a yearning for university affiliations, born partly of intellectual discontent and partly of necessity. Unlike the college freshman, many theological professors and most theological students have felt the power of modern science and thought, and the weakness of dogmatics, apologetics, and Hebrew grammar as defenders of their faith. Not long ago, one of the largest seminaries in the country was peremptorily ordered by its students to modernize its curriculum; and, on every hand, the demand is being made that religious opinions be left to individuals, and the seminary teach biology, psychology, history, ethics, hygiene, and social reform. The result, at this hour, is incongruous in the extreme. While the universities are crying, "Let the seminaries come to us, that we may be spiritualized!" theological students ask for a chemical laboratory that they may be trained in modern scientific method. But the incongruity is natural. The forces of intellectual conservatism reside in the masses; they make themselves felt most acutely in the ordinary college simply because the latter is the meeting-place of culture and the average man. In the seminary, though, and particularly in those which have lived through an open controversy between dogma and liberalism, a handful of cultivated churchmen, half secluded and full of doubts, are seeking to square their beliefs with modern knowledge and their practises with the needs of modern life. Their own perplexities and their remoteness from the unschooled laity make them liberals. No wonder, then, that a training school for Protestant ministers may welcome a philosopher obnoxious to a nominally unsectarian university.—New York *Evening Post.*

DISCUSSION AND CORRESPONDENCE

MATHEMATICS FOR ENGINEERS

To the Editor of Science: I have followed the recent discussion of mathematics for engineers with much interest and with a great sense of satisfaction that at last the discussion of technical education is being published in a place where it must, perforce, be brought to the notice of our physicists; for our physicists (I mean to refer to them here in their capacity as teachers) have paid but little attention to the remarkably active discussion of technical education that has been going on for several years.

Something is wrong with technical education, that is quite evident, but I am not entirely satisfied with any diagnosis which up to this time has been given of the situation. I think that the most vital question which now confronts us in the field of technical education is how adequately to establish the *perceptive phase* of the physical sciences. In order that I may explain precisely what I mean by this expression, I must use an example:

Nothing is more completely established by experience than the necessity of employing an active agent, such as a horse or a steam engine, to drive the machinery of a mill or factory, to draw a car, or to propel a boat. The common feature of every case in which motion is thus maintained is that *a force is exerted upon a moving body and in the direction in which the body moves.* Such a force is called an *active force*, and to keep up an active force involves continuous effort, or cost. A force which acts upon a stationary body, on the other hand, may be kept up indefinitely without cost or effort; such a force is called an *inactive force.* Thus, a weight resting on a table continues to push downwards on the table, a weight suspended by a string continues to pull on the string, the mainspring of a watch continues indefinitely to exert a force upon the wheels of the watch if the watch is stopped. The idea of an inactive force is applicable also to a force which acts upon a moving body, but at right angles to the direction in which the body moves. Thus, the force with